

Preliminary Amendment
Paper Date: 28 September 2004

BLU AVAILABLE COPY
Attorney Docket 60.1528
Page 2 of 12

This listing of claims will replace all prior versions, and listings, of claims in the application:

Please cancel claims 7, 13, 25, 32, 34, 43, 46, 47, 50, 51, 59, 64, 71, and 74 and amend claims 1, 8, 26, 30, 33, 35, 37-40, 45, 48, 49, 57, 60, 61, 69, 73, and 75 as follows:

Listing of Claims

1. (currently amended) An electrical feedthru apparatus comprising:
 - an electrically conductive transmission line;
 - a coating of diamond-like carbon or diamond thin film dielectric material disposed over the electrically conductive transmission line; and
 - a housing attached about at least a portion of the electrically conductive transmission line.
2. (original) The electrical feedthru apparatus of claim 1, wherein the coating is a micro-coating.
3. (original) The electrical feedthru apparatus of claim 2, wherein the electrically conductive transmission line is electro-polished.
4. (original) The electrical feedthru apparatus of claim 2, wherein the micro-coating is approximately 100 μm thick or less.
5. (original) The electrical feedthru apparatus of claim 2, wherein the micro-coating is approximately 10 μm thick or less.
6. (original) The electrical feedthru apparatus of claim 2, wherein the micro-coating is approximately 5 μm thick or less.

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 3 of 12

7. (cancelled)

8. (currently amended) The electrical feedthru apparatus of claim 1, wherein the coating ~~DLC~~ comprises silicon for enhancing adhesion to the electrically conductive transmission line.

9. (original) The electrical feedthru apparatus of claim 1, further comprising two or more layers of the coating.

10. (original) The electrical feedthru apparatus of claim 9, wherein each of the two or more layers is approximately 2-5 μm thick.

11. (original) The electrical feedthru apparatus of claim 9, wherein a first of the two or more layers is approximately 1 μm thick or less.

12. (original) The electrical feedthru apparatus of claim 1, wherein the coating comprises a thermal conductor.

13. (cancelled)

14. (original) The electrical feedthru apparatus of claim 2, wherein the micro-coating has a breakdown voltage on the order of 100V per μm thickness.

15. (original) The electrical feedthru apparatus of claim 1, further comprising a secondary coating disposed over the coating of dielectric material.

16. (original) The electrical feedthru apparatus of claim 15, wherein the secondary coating comprises a dielectric adhesive attaching the electrically conductive transmission line to the housing.

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 4 of 12

17. (original) The electrical feedthru apparatus of claim 16, wherein the dielectric adhesive comprises Araldite GY 6010 or Amine Hardener Hy 5200.

18. (original) The electrical feedthru apparatus of claim 15, wherein the secondary coating comprises a metal layer brazed between the dielectric coating and the housing.

19. (original) The electrical feedthru apparatus of claim 1, wherein the electrically conductive transmission line and the housing are attached by a compression or interference fit between mating tapered surfaces.

20. (original) The electrical feedthru apparatus of claim 1, further comprising a plurality of electrically conductive transmission lines each coated with a dielectric coating spaced from one another and attached within the housing.

21. (original) The electrical feedthru apparatus of claim 20, wherein a density of the electrical conductive transmission lines within the housing is greater than 0.32 transmission lines per mm².

22. (original) The electrical feedthru apparatus of claim 21, wherein the density of the electrical conductive transmission lines within the housing is at least 0.4 transmission lines per mm².

23. (original) The electrical feedthru apparatus of claim 22, wherein a density of the electrical conductive transmission lines within the housing is at least 0.8 transmission lines per mm².

24. (original) The electrical feedthru apparatus of claim 1, wherein the coating comprises a diamond thin film applied by microwave plasma chemical vapor deposition (MPCVD).

25. (cancelled)

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 5 of 12

26. (currently amended) An electrical feedthru apparatus comprising:

- an outer body;
- a conductive pin disposed in the outer body;
- an electrically insulating diamond-like carbon or diamond thin film micro-coating between the conductive pin and the outer body.

27. (original) The electrical feedthru apparatus of claim 26, wherein the insulating coating is less than 100 μm thick.

28. (original) The electrical feedthru apparatus of claim 27, wherein the insulating coating is less than 5 μm thick.

29. (original) The electrical feedthru apparatus of claim 28, wherein the insulating coating is less than 2 μm thick.

30. (currently amended) An electrical feedthru apparatus comprising:

- a body;
- a plurality of conductive pins extending through the body and having diamond-like carbon coatings or diamond thin films electrically insulating each of the conductive pins from the body;
- wherein the conductive pin density comprises at least 0.4 pins per mm^2 .

31. (original) The electrical feedthru apparatus of claim 30, wherein the conductive pin density comprises at least 0.8 pins per mm^2 .

32. (cancelled)

33. (currently amended) An electrical feedthru comprising:

- a body;
- a conductive pin; and

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 6 of 12

a highly dielectric diamond-like carbon coating or diamond thin film ~~thin film~~
adhered to at least a portion of the conductive pin;
wherein the conductive pin extends through and is attached to the body.

34. (cancelled)

35. (currently amended) The electrical feedthru of claim 33, wherein the diamond-like carbon coating or diamond thin film ~~thin film~~ comprises multiple layers.

36. (original) The electrical feedthru of claim 35, wherein a first of the multiple layers is less than 1 μm thick, and subsequent layers range between 1 and 10 μm thick.

37. (currently amended) An electrical feedthru comprising
a conducting pin;
a diamond-like carbon coating or diamond thin film adhered to the conducting pin;
a body attached around the diamond-like carbon coating or diamond thin film.

38. (currently amended) The electrical feedthru of claim 37, further comprising a plurality of conducting pins each coated with a diamond-like carbon coating or diamond thin film disposed in the body.

39. (currently amended) The electrical feedthru of claim 37, wherein the diamond-like carbon coating or diamond thin film comprises a first layer of 0.2 to 10 μm thick.

40. (currently amended) A multi-pin feedthru comprising:
a plurality of conductive pins extending through a single body, each of the plurality of conductive pins being spaced from one another; and
at least one thin film layer of diamond-like carbon coating or diamond thin film dielectric material disposed over each of the plurality of conducting pins providing electrical insulation between the pins and the body.

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 7 of 12

41. (original) The multi-pin feedthru of claim 40, wherein each of the plurality of conductive pins is substantially parallel to the others.

42. (original) The multi-pin feedthru of claim 40, wherein the plurality of conductive pins comprises at least six pins arranged within no more than a 4 mm diameter.

43. (cancelled)

44. (original) The multi-pin feedthru of claim 40, wherein the at least one thin film layer is between 0.2 and 10 μm thick.

45. (currently amended) An electrical feedthru comprising:

an electrically conductive pin;

an electrically insulative, thermally conductive diamond-like carbon coating or diamond thin film coating adhered to the electrically conductive pin;

wherein the electrically conductive pin is hermetically sealed to a body through which the electrically conductive pin traverses.

46. (cancelled)

47. (cancelled)

48. (currently amended) The electrical feedthru of claim 45, wherein the electrically insulative, thermally conductive diamond-like carbon coating or diamond thin film coating comprises one or more layers ranging between 0.2 and 10 μm in thickness.

49. (currently amended) An electrical feedthru comprising:

one or more electrical pathways;

an outer body through which the one or more electrical pathways penetrate;

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 8 of 12

an electrical isolator between the one or more electrical pathways and the outer body;

wherein the electrical isolator comprises a layer of diamond-like carbon coating or diamond thin film of no more than 100 μm .

50. (cancelled)

51. (cancelled)

52. (original) The electrical feedthru of claim 49, wherein the electrical isolator comprises a layer of no more than 10 μm .

53. (original) The electrical feedthru of claim 49, wherein the outer body separates two distinct environments.

54. (original) The electrical feedthru of claim 49, wherein the electrical isolator comprises a plurality of layers ranging between approximately 0.2 μm and 10 μm in thickness.

55. (original) The electrical feedthru of claim 54, wherein each of the plurality of layers comprises a breakdown voltage of at least approximately 50 volts per μm of layer thickness.

56. (original) The electrical feedthru of claim 55, wherein each of the plurality of layers comprises a breakdown voltage of at least approximately 100 volts per micrometer of layer thickness.

57. (currently amended) An apparatus comprising:

a micro-electro-mechanical-system (MEMS) package;

an electrical feedthru electrically attached to the MEMS package and disposed between two distinct environments, the electrical feedthru comprising:

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 9 of 12

a housing;
an electrical pathway passing through the housing; and
~~as a diamond-like carbon coating or diamond thin film~~ electrical
isolator less than about 500 μm thick disposed between the housing and the electrical
pathway.

58. (original) The apparatus of claim 57, wherein the electrical isolator is less than
100 μm thick.

59. (cancelled)

60. (currently amended) The apparatus of claim ~~57~~ 59, wherein the electrical isolator
comprises one or more layers ranging between approximately 0.2 and 10 μm in
thickness.

61. (currently amended) A method of making an electrical feedthru comprising
coating a conductive pin with a layer of highly dielectric diamond-like carbon coating
or diamond thin film material and attaching the conductive pin ~~to~~ within and
extending through a housing.

62. (original) The method of claim 61, wherein the coating is about 10 μm thick or
less.

63. (original) The method of claim 61, further comprising coating the conductive pin
with multiple layers of highly dielectric material.

64. (cancelled)

65. (original) The method of claim 61, further comprising applying a dielectric
adhesive to the housing, the conductive pin, or both the housing and the conductive
pin to attach the conductive pin to the housing.

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 10 of 12

66. (original) The method of claim 61, wherein the attaching comprises:
metalizing an outer surface of the conductive pin over the layer of highly dielectric material; and
brazing the conductive pin to the housing.

67. (original) The method of claim 61, wherein the attaching comprises:
heating the housing to a temperature above ambient;
inserting the conductive pin in a corresponding hole in the housing; and
cooling the body to compress the conductive pin within the housing.

68. (original) The method of claim 67, wherein the attaching further comprises providing mating tapered surfaces to the conductive pin and the housing.

69. (currently amended) A method of controlling capacitance of an electrical feedthru comprising coating a conductive pin with one or more micro-layers of diamond-like carbon coating or diamond thin film dielectric material and placing said conductive pin within and extending through a housing.

70. (original) The method of claim 69, further comprising varying the thickness of the one or more micro-layers of dielectric material.

71. (cancelled)

72. (original) The method of claim 69, further comprising adding a layer of adhesive over the one or more micro-layers of dielectric material.

73. (currently amended) A method of electrically interfacing between two distinct environments comprising:
inserting an electrical feedthru within and extending through a housing between the two distinct environments;

Preliminary Amendment
Paper Date: 28 September 2004

Attorney Docket 60.1528
Page 11 of 12

wherein the electrical feedthru comprises one or more electrical transmission lines coated with one or more layers of a highly dielectric diamond-like carbon coating or diamond thin film thin film.

74. (cancelled)

75. (currently amended) A method of making an electrical feedthru comprising coating an inner surface of a hole through a housing with a layer of highly dielectric diamond-like carbon coating or diamond thin film material and attaching a conductive pin within the hole.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.